Remarks

Initially, applicants note that the final Office Action comprises a new grounds of rejection and therefore this is their first opportunity to comment on the combination of Katayama and Wheeler et al. Therefore, applicants respectfully request that the Examiner consider their position with respect to this art as set forth below.

In the Office Action, claim 29 was rejected under 35 U.S.C. §102(e) as being anticipated by Wheeler et al. (U.S. Pat. No. 5,825,680); claims 1-4, 10-12, 18-20 and 23-25 were rejected under 35 U.S.C. §103(a) as being unpatentable over Katayama (U.S. Pat. No. 5,422,736) in view of Wheeler et al.; claims 5-6, 9 and 21 were rejected under 35 U.S.C. §103(a) as being unpatentable over Katayama and Wheeler as applied to claims 1 and 18, respectively, and further in view of Sasaki et al. (U.S. Pat. No. 5,530,478); claims 7-8 & 22 were rejected under 35 U.S.C. §103(a) as being unpatentable over Katayama and Wheeler et al. as applied to claims 1 and 18, respectively, and further in view of Rick et al. (U.S. Pat. No. 5,987,179); and claims 13-17 & 26-28 were rejected under 35 U.S.C. §103(a) as being unpatentable over Katayama and Wheeler et al. as applied to claims 1 and 18, respectively, and further in view of Hosono (U.S. Pat. No. 5,796,438). Each of these rejections is respectfully, but most strenuously, traversed and reconsideration thereof is requested.

With respect to claim 29, Wheeler et al. describe a method and apparatus for performing fast division in accordance with certain bandwidth requirements particular to an implementation described therein. A pseudo pipelined approach for performing division using the SRT non-restoring division algorithm is described which uses a minor clock and a major clock cycle time. The number of stages in the division pipeline is a function of

the parameters bandwidth requirements of the system. More particular to the present invention, the Office Action cites column 13, lines 18-32 of Wheeler et al. as relevant to the presently claimed invention. These lines describe a quantization unit 644 shown in FIG. 28. In the preferred embodiment, there are two quantization tables; i.e., one table is used when operating on intra-coded macroblocks, and the other table is used on non-intra-coded macroblocks. These quantization tables are stored in queue table RAMS 690. At column 13, lines 24-32, the patent states:

> ...In the preferred embodiment there are two quantization tables; one table is used when operating on intra-coded macroblocks, the other table is used on non-intra-coded macroblocks.
>
> As shown in FIG. 7, the quantization tables are stored in Q table RAMS 690. The CPU is responsible for loading all Q table entries. During encode and decode, the CPU loads the tables as required. Thus, the CPU is responsible for updating Q tables on video stream context switches.

Applicants respectfully submit that a careful reading of Wheeler et al. indicates that the patent is simply describing the MPEG standard which requires the use of an intra-coded matrix table and a non-intra-coded matrix table, and therefore requires a switching from the intra table to the non-intra table during the encoding process. The above-noted lines of column 13 of the patent clearly would be read by one skilled in the art as referring to this switching between intra and non-intra tables at a context switch, e.g., a scene change. Applicants respectfully submit that to read the sentences otherwise is a hindsight misinterpretation of the language noted.

Applicants invention recited in claim 29 includes computer readable program code means for storing multiple sets of quantization matrix tables, wherein each set of quantization

matrix tables comprises a separate, independent set of tables, and each set comprises at least one intra matrix table and at least one non-intra matrix table. The present invention assumes a normal "real time" switching of intra and non-intra tables such as described in Wheeler et al., but further adds the ability to dynamically switch from one complete set of intra and non-intra tables to another complete set of intra and non-intra tables in real time, in a single pass without requiring stopping of the encoding process.

A careful reading of Wheeler et al. fails to uncover any discussion of switching between sets of tables. The patent expressly teaches in a preferred embodiment there are two quantization tables. One table is for operating on intra-coded macroblocks, and the other table is used for non-intra-coded macroblocks. In contrast, applicants recite switching between sets of tables, wherein one set comprises at least one intra matrix table and at least one non-intra matrix table. Thus, in applicants' approach, there are a minimum of four quantization tables between which the dynamic switching occurs. Since there is no express teaching of this set switching concept in Wheeler et al., applicants respectfully request reconsideration and withdrawal of the anticipation rejection to claim 29 based thereon.

Independent claim 1 & 18 were rejected in the final Office Action based upon the new combination of Katayama in view of Wheeler et al. As noted above, this rejection is respectfully traversed and reconsideration is requested.

Katayama describes a technique for encoding image data which maintains the quality of the image. The patent notes that it has been conventional practice that coefficients obtained from discrete cosine transformation are quantized using a single quantization table. If, however, an identical quantization is

performed for images that are considerably dissimilar in their statistical characteristic, deterioration of image occurs especially at character portions where high frequency dominates.

In FIG. 8 of Katayama, three quantization tables are shown. One table holds chrominance coefficients, and two tables hold luminance coefficients, one for photographs 59, and the other for characters (i.e., letters) 58 within the photographs. As described at column 9, lines 24-44 of the patent, a character/photograph judging method is taught in which a block is considered a character region when an edge exists within that block, while it is considered a photograph region if no edge exists. (As used in the application, a block refers to a macroblock of data within a picture). Any system capable of character/photograph judgment may be used to make the determination of an edge. A switching signal is provided to a selector (56 or 57 in FIG. 8) which selects either a character-Y quantization table or a photograph-Y quantization table, or the chrominance table.

A careful reading of Katayama fails to uncover any teaching, suggestion or implication that a set of matrix tables are employed wherein the set comprises at least one intra matrix table and at least one non-intra matrix table. This is expressly recognized by the Examiner in the Office Action where it is stated that "Katayama does not particularly disclose Q matrix tables comprising at least one intra matrix table and at least one non-intra matrix table." Applicants agree.

However, the Office Action then goes on to combine the teachings of Wheeler et al. to somehow arrive at applicants' concept of switching between sets of matrix tables wherein each set comprises at least one intra matrix table and at least one non-intra matrix table. The combination of Wheeler et al. with Katayama is respectfully traversed to any extent deemed

applicable to the present application.

Although not expressly stated, it is clear from a reading of Katayama that the patent is addressing encoding of still images. First, a careful reading of Katayama fails to uncover any discussion of motion or motion estimation during the encode process. In addition, throughout the patent Katayama makes reference to facsimilies, still photos and a character/photograph judgment scheme. For example, column 1, lines 9-12 indicate that the field of the invention relates to image processing applicable to a color facsimile, color image file and the like. Column 4, lines 29-36 indicate that an image output device may be used such as a laser beam printer, an ink-jet printer or a display device. Obviously, motion video cannot be printed using a laser beam printer or an ink-jet printer, but a photo can be displayed on a display device. Column 5, lines 37-49 refer to quantization tables for Y data to be used for photographs, and for Y data to be used for characters. The patent consistently discusses switching between the photograph-Y-data quantization table and the character-Y-data quantization table in accordance with a character/photograph judgment. The character/photograph judgment is also discussed at columns 8 & 9 of the patent. Based upon the above, applicants respectfully submit that Katayama is describing encoding of still photographs which may contain character information within the photograph.

Encoding of still photographs is significantly different than encoding motion video. In a still photograph encode process, all pixel information is used, i.e., intra data on the photograph is used in order to detect edges of the characters. Thus, applicants respectfully submit that one skilled in the art would understand Katayama as using intra-coded tables for the chrominance and luminance tables referred to in the patent. In fact, non-intra-coded tables could not exist in a still photograph encode process such as described by Katayama. As

understood by one skilled in the art, non-intra matrix tables arise and are employed during motion estimation, i.e., for bi-directionally encoded frames of a video. Because Katayama itself inherently teaches away from the proposed combination, applicants respectfully request reconsideration and withdrawal of the obviousness rejection to independent claims 1 & 18 based upon the purported combination of the teachings of Katayama and Wheeler et al.

Notwithstanding the above, applicants respectfully submit that the Examiner's proposed combination of the teachings of Wheeler et al. with Katayama would still not produce the invention as claimed herein. As noted above, Wheeler et al. is describing switching between one intra table and one non-intra table during an encode process. In contrast, applicants' claimed invention recites switching between sets of tables, wherein one set of tables is defined as comprising at least one intra table and at least one non-intra table. Thus, applicants are switching between two sets of tables wherein each set comprises at least two tables. Since both Katayama and Wheeler et al. are devoid of this concept, applicants respectfully submit that one skilled in the art would not have considered the claimed invention obvious in view thereof even if combined in some manner as suggested in the Office Action.

To summarize, applicants respectfully submit that there is no suggestion in the prior art which would have led one skilled in the art to their claimed invention. The purported combination of Wheeler et al. with Katayama is clearly contrary to the entire purpose of Katayama, and even if the combination were made as proposed, the resultant encoder would still not comprise applicants' claimed invention.

The dependent claims are believed allowable for the same reasons as their respective independent claims, as well as for

their own additional characterizations. For example, in claim 4 applicants recite that the means for dynamically switching further comprises a table set register wherein the quantizer is adapted to control the switching of the quantizer from one set of quantization matrix tables to another set of quantization matrix tables. The Office Action alleges that the MQUANT register 692 in Wheeler comprises a "table set register" with a function as recited by applicants in claim 4. This is respectfully traversed. The MQUANT register 692 is well known in the art for holding quantization step size. The register does not function or assist in switching between sets of matrix tables. Further, with respect to claim 12, a careful reading of Katayama and Wheeler et al. fails to uncover any teaching or suggestion of the recited concept of dynamically changing quantization matrix tables of a presently unused set of quantization matrix tables of the multiple sets of tables, while still quantizing a sequence of video data using one set of tables or the other set of tables.

Based upon the above, applicants respectfully submit that the application is in condition for allowance and request such action.

Respectfully submitted,

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